

WHAT IS CLAIMED IS:

1. An apparatus for calculating an aging deterioration margin amount of a LSI for calculating an aging deterioration margin amount to be included as a design tolerance with respect to a predetermined property of the LSI so that the LSI can operate even if the property deteriorates, comprising:

beginning-of-life property generating means for obtaining a property before deterioration of the property in an initial state of the LSI with respect to at least a part of a plurality of signal paths constituting the LSI;

end-of-life property generating means for obtaining a property after deterioration of the property when a predetermined operation period has passed under a predetermined operating condition with respect to at least a part of a plurality of signal paths constituting the LSI;

property deterioration degree generating means for obtaining a property deterioration degree which is a ratio of the property after deterioration to the property before deterioration in a signal path having a smallest tolerance of the property after deterioration with respect to a property necessary for the LSI to operate of the plurality of signal paths; and

aging deterioration margin amount generating means for substantially obtaining an aging deterioration margin amount based on the property before deterioration and the property

deterioration degree.

2. The apparatus for calculating an aging deterioration margin amount of a LSI according to claim 1, wherein

5 the aging deterioration margin amount generating means obtains an aging deterioration margin amount that is a difference between a product of the property before deterioration and the property deterioration degree, and the property before deterioration.

10 3. The apparatus for calculating an aging deterioration margin amount of a LSI according to claim 1, wherein

the aging deterioration margin amount generating means substantially obtains an aging deterioration margin amount by
15 obtaining a product of the property before deterioration and the property deterioration degree.

4. The apparatus for calculating an aging deterioration margin amount of a LSI according to claim 1, wherein

20 the aging deterioration margin amount generating means obtains the property before deterioration and the property deterioration degree, and further substantially obtains an aging deterioration margin amount based on a predetermined tolerance rate.

25 5. The apparatus for calculating an aging deterioration margin amount of a LSI according to claim 1, wherein

the end-of-life property generating means for obtaining the property after deterioration with respect to signal paths of a group having a small tolerance of the property before deterioration with respect to a property necessary for the LSI to operate of a plurality of groups into which a plurality of signal paths constituting the LSI are divided.

6. The apparatus for calculating an aging deterioration margin amount of a LSI according to claim 1, wherein

the aging deterioration margin amount generating means obtains the substantial aging deterioration margin amount with respect to a signal path different from the signal paths for which the property deterioration degree is obtained.

7. The apparatus for calculating an aging deterioration margin amount of a LSI according to claim 1, wherein

the property before deterioration is a delay before deterioration,

the property after deterioration is a delay after deterioration,

the property deterioration degree is a delay deterioration rate

the property necessary for the LSI to operate is a design target delay, and

the aging deterioration margin amount is a delay deterioration margin amount.

8. The apparatus for calculating an aging deterioration margin amount of a LSI according to claim 7, wherein

the aging deterioration margin amount generating means uses the property deterioration degree as a derating factor corresponding to aging deterioration of the property to calculate a largest delay including the aging deterioration margin amount by multiplying the delay before deterioration by derating factors corresponding to each of at least a product deviation, a supply voltage variation, and a temperature variation as well as the derating factor corresponding to aging deterioration of the property.

9. The apparatus for calculating an aging deterioration margin amount of a LSI according to claim 7, wherein

a supply voltage condition in the predetermined operating conditions when the end-of-life property generating means obtains the property after deterioration is different from a supply voltage condition under which the beginning-of-life property generating means and the end-of-life property generating means obtain the property before deterioration and the property after deterioration.

10. The apparatus for calculating an aging deterioration margin amount of a LSI according to claim 7, wherein

the beginning-of-life property generating means and the end-of-life property generating means obtain the delay before deterioration and the delay after deterioration, using the

property of the element whose delay before deterioration and delay after deterioration are largest in a range of a property deviation of elements constituting the LSI.

5 11. The apparatus for calculating an aging deterioration margin amount of a LSI according to claim 10, wherein

the property of the element whose delay before deterioration and delay after deterioration are largest is a lowest response of the element.

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12. The apparatus for calculating an aging deterioration margin amount of a LSI according to claim 7, wherein

15 a supply voltage condition in the predetermined operating conditions when the end-of-life property generating means obtains the property after deterioration is different from a supply voltage condition under which the beginning-of-life property generating means and the end-of-life property generating means obtain the property before deterioration and the property after deterioration, and

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the beginning-of-life property generating means and the end-of-life property generating means obtain the delay before deterioration and the delay after deterioration, using the property of the element in which a delay before deterioration and a delay after deterioration are largest in a range of a deviation of a property of elements constituting the LSI.

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13. An apparatus for calculating an aging deterioration

margin amount of a LSI for calculating an aging deterioration margin amount to be included as a design tolerance with respect to a predetermined property of the LSI so that the LSI can operate even if the property deteriorates, comprising:

aging deterioration margin amount generating means for substantially obtaining an aging deterioration margin amount, based on

10 a property before deterioration of the property in an initial state of the LSI with respect to at least a part of a plurality of signal paths constituting the LSI; and

15 a property deterioration degree obtained by obtaining a property after deterioration of the property when a predetermined operation period has passed under a predetermined operating condition with respect to at least a part of a plurality of signal paths constituting the LSI, and obtaining a ratio of the property after deterioration to the property before deterioration in a signal path having a smallest tolerance of the property after deterioration with
20 respect to a property necessary for the LSI to operate of the plurality of signal paths, the ratio being the property deterioration degree.

14. A method for calculating an aging deterioration margin
25 amount of a LSI for calculating an aging deterioration margin amount to be included as a design tolerance with respect to a predetermined property of the LSI so that the LSI can operate

even if the property deteriorates, comprising:

5 a beginning-of-life property generating step for obtaining a property before deterioration of the property in an initial state of the LSI with respect to at least a part of a plurality of signal paths constituting the LSI;

10 an end-of-life property generating step for obtaining a property after deterioration of the property when a predetermined operation period has passed under a predetermined operating condition with respect to at least a part of a plurality of signal paths constituting the LSI;

15 a property deterioration degree generating step for obtaining a property deterioration degree which is a ratio of the property after deterioration to the property before deterioration in a signal path having a smallest tolerance of the property after deterioration with respect to a property necessary for the LSI to operate of the plurality of signal paths; and

20 an aging deterioration margin amount generating step for substantially obtaining an aging deterioration margin amount based on the property before deterioration and the property deterioration degree.

15. A method for inspecting a LSI with respect to a predetermined property of the LSI that the LSI can operate
25 even if the property deteriorates, comprising:

obtaining a property before deterioration of the property in an initial state of the LSI with respect to at

least a part of a plurality of signal paths constituting the LSI;

obtaining a property after deterioration of the property when a predetermined operation period has passed
5 under a predetermined operating condition with respect to at least a part of a plurality of signal paths constituting the LSI;

obtaining a property deterioration degree which is a ratio of the property after deterioration to the property
10 before deterioration in a signal path having a smallest tolerance of the property after deterioration with respect to a property necessary for the LSI to operate of the plurality of signal paths; and

inspecting an operation of the LSI using a frequency
15 obtained by multiplying the property deterioration degree by a predetermined frequency as an operation frequency.